TENNESSEE PERINATAL CARE SYSTEM

GUIDELINES FOR TRANSPORTATION

(Fourth Edition)

December 2001

Tennessee Department of Health
Maternal and Child Health

Don Sundquist
Governor

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Commissioner

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GUIDELINES FOR TRANSPORTATION

(Fourth Edition)

Prepared by the
Subcommittee on Perinatal Transportation
of the
Perinatal Advisory Committee

December 2001

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TENNESSEE PERINATAL CARE SYSTEM

GUIDELINES FOR TRANSPORTATION

PREFACE

This manual is a revision of the Guidelines for Transportation in the State of Tennessee that was originally published in September 1979. These guidelines are written in response to the recommendation of the Perinatal Advisory Committee and are developed to accomplish improvement in the overall quality of maternal-newborn transportation in the state. Prepared by the Subcommittee on Perinatal Transportation, and adopted by its parent committee, the Perinatal Advisory Committee, this manual has been carefully considered by representatives from a broad spectrum of the health care delivery disciplines from throughout the state. This manual provides specific guidelines regarding procedures, staffing patterns, and equipment for the transport of high-risk mothers and neonates. It is hoped that physicians, nurses, and other health care providers involved with such transportation will make reasonable efforts to attain the guidelines described herein.

In order to insure the contemporary pertinence of these guidelines, the Perinatal Advisory Committee has limited its approval to a period that is no longer than five years from the date of approval by the Commissioner of the Department of Health. A complete review will thus be mandatory at that time, or sooner if deemed appropriate.

INTRODUCTION

INTRODUCTION

The transport of pregnant women and newborn infants between hospitals is recognized as an essential component of regionalized perinatal care. National experience suggests that perinatal outcome for high-risk infants transported before delivery (maternal transport) is improved over that for high-risk infants transported after birth (neonatal transport). Tennessee experience supports this also. The Subcommittee on Perinatal Transportation of the Perinatal Advisory Committee, therefore, strongly urges that maternal transport to an appropriate referral center be considered, especially in those pregnancies in which there is a high probability of neonatal transport following delivery (Resolution passed by the Perinatal Advisory Committee on March 31, 1982).

Safe transport of the perinatal patient requires skilled personnel, appropriate equipment, and effective communication between the hospital facilities of the region. The purpose of this manual is to present specific guidelines to physicians, nurses, and other health care providers involved with maternal-neonatal transport, so that such a transfer may be conducted in the most optimal manner.

This manual is divided into three main sections: Level I Facilities, Level II Facilities (subdivided by regionalization into Level II-A and Level II-B), and Level III Facilities. The guidelines within each section are organized in the subsections highlighted below. In each of these subsections, maternal transport discussion precedes neonatal discussion.

1. Indications for Consultation and/or Transport
   The circumstances in which patients are transported vary according to the level of care of the facilities in each region. The indications highlighted in this subsection are designed to assist the health care providers in seeking consultation and/or transfer. These indications remain guidelines and will vary with individual patient needs and institutional capabilities.

2. Referral Process
   The transfer of care of a perinatal patient from one care facility to another requires effective communication between facilities and a clear understanding of the responsibilities of the parties involved. The guidelines highlighted in this subsection are designed to clarify the roles of both referring and receiving facilities.

3. Transport Personnel
   The level of expertise of the transport personnel needed to provide optimal transfer of pregnant women and newborn infants is variable and largely dependent on the complexity of care demanded by the individual patient. However, in order to eliminate any possibility of encountering a situation in which the demands of the transported patient exceed the care level that can be adequately provided, it is desirable to define certain minimal requirements. The guidelines highlighted in this subsection are designed to assist the health care providers in selecting appropriate transport personnel.

4. Transport Vehicle
   The choice of a transport vehicle is largely determined by the distance between hospitals, condition of the patient, and equipment available in the vehicle to support the patient during transfer. The guidelines highlighted in this subsection are designed to assist the health care providers in selecting the appropriate transport vehicle.

5. Transport Equipment
   A safe perinatal transport entails availability of adequate equipment for monitoring, resuscitation, and support of both mother and neonate. In addition to the equipment in the transport vehicle, essential supplies should be portable and continuously available during the transport. The equipment needs highlighted in this subsection are designed to assist the health care providers in selecting appropriate transport equipment.

6. Referral Documentation
   An essential component of communication between care facilities is clear documentation and transfer of medical information. The guidelines highlighted in this subsection are designed to clarify the responsibilities of both referring and receiving facilities with respect to medical documentation.

7. Evaluation of Referral Process
   The success of a regionalized perinatal care system depends on an ongoing evaluation of various aspects of the program including transport of the perinatal patient. This subsection highlights the need for evaluation of the referral process.

Optimal utilization of a regionalized perinatal care system entails early planning and return transport of patients from the referral centers to the original or local hospitals for further care. This manual ends with a section on return transport in which various aspects of this activity are summarized.

LEVEL I FACILITIES

MATERNAL TRANSPORT

Level I

LEVEL I UNITS:

Level I units provide basic care for uncomplicated maternity and neonatal patients. All high-risk mothers and neonates must be promptly identified for referral and/or consultation for more specialized care. The Level I unit shall provide equipment and staff to care for maternity patients whose onset of labor occurs after 34 completed weeks, for neonates whose birthweight is over 2000 grams, and for sick patients pending transfer to another hospital. The Level I unit must also provide care for convalescing neonates who are transferred from other institutions to be closer to home.

INDICATIONS FOR MATERNAL CONSULTATION AND/OR TRANSPORT

I. ANTEPARTUM

A. Maternal History

1. preterm labor (<37 weeks) or low-birthweight neonate (<2500 gm)
2. previous neonate >4000 gm at term or any large-for-gestational age neonate
3. previous stillbirth, neonatal loss, or two or more abortions
4. suspected insufficient cervix
5. medical indication for termination of previous pregnancy
6. diagnosed abnormality of the genital tract
7. neonate who required more than routine observation or care
8. neonate with known or suspected genetic disorder
9. severe emotional problems associated with previous pregnancy or delivery
10. previous vertical or classical uterine incision
11. age <16 or advanced maternal age (≥35 years of age at delivery)
12. prepregnancy weight <45 kg or >90 kg
13. height <150 cm

B. Medical/Surgical Complications

1. diabetes mellitus/endocrine disorder
2. autoimmune disorder
3. cardiac disease
4. hypertension
5. pulmonary disease
6. renal disease
7. hematologic disorder
8. neurologic disorder
9. musculoskeletal disorder
10. infection
11. nutritional disorder
12. substance use
13. malignancy
14. psychiatric disorder
15. trauma
16. surgical emergency

C. Obstetric Complications

1. glucose intolerance
2. urinary tract infection

3. sexually transmitted disease
4. suspected ectopic pregnancy
5. suspected missed abortion
6. hyperemesis
7. exposure to teratogen
8. isoimmunization
9. persistent anemia
10. vaginal bleeding
11. preeclampsia/eclampsia
12. suspected polyhydramnios or oligohydramnios
13. preterm cervical dilatation without uterine activity
14. preterm rupture of membranes with or without uterine activity
15. rupture of membranes at term for more than 12 hours without labor and/or evidence of amnionitis or sepsis at any time
16. suspected feto-pelvic disproportion
17. inappropriate fetal growth for gestational age
18. multiple gestation
19. postterm gestation (>42 weeks)
20. fetal demise
21. known or suspected fetal anomaly
22. abnormal triple screen

II. INTRAPARTUM

A. preterm (<37 weeks) cervical dilatation with uterine contractions
B. abnormal presentation
C. suspected feto-pelvic disproportion
D. dysfunctional labor
E. rupture of membranes at term for more than 12 hours and/or evidence of amnionitis or sepsis at any time
F. abnormal bleeding
G. suspected nonreassuring fetal status
H. preeclampsia/eclampsia
I. uterine hyperstimulation syndrome
J. meconium in amniotic fluid
K. multiple gestation

III. POSTPARTUM

A. preeclampsia/eclampsia
B. sepsis
C. abnormal bleeding
D. thromboembolic disease
E. cardiopulmonary dysfunction
F. neonatal transport

MATERNAL REFERRAL PROCESS

I. Maternal transport is initiated by the health care provider responsible for the patient's medical care. Maternal referral may lead to admission of the patient to the receiving hospital (inpatient transport) or to outpatient evaluation and management (outpatient transport). The guidelines for the referral process are outlined below.

II. INPATIENT TRANSPORT

A. Referring Center Responsibilities:

1. The decision by the referring care provider (physician, certified nurse midwife, nurse practitioner) to request consultation is the first step in the referral process.
2. Telephone consultation with the receiving physician is necessary to initiate the referral process and to prepare the receiving center. This consultation may aid the care provider in developing a treatment plan for stabilizing the patient before and during transport.
3. It is the referring facility's responsibility to follow the COBRA/EMTALA guidelines. (42 USC 1395dd. Section 1867 of the Social Security Act. Also known as Section 9121 of the Consolidated Omnibus Budget Reconciliation Act of 1985. See Appendix IX.)
4. The referring care provider is responsible for the patient until arrival at the receiving center.
5. A ground ambulance is the most appropriate vehicle for the majority of maternal transports. If an alternate form of transportation is being considered, the referring physician should discuss this alternative with the receiving physician at the time of consultation.
6. The medical record should be organized as the patient is prepared for transport.
7. The composition of the transport team should be a joint decision between the referring and receiving care providers based on the condition of the mother and/or fetus.
8. To avoid unnecessary delays in the emergency room or admitting office, all referrals should be directly admitted to the receiving obstetric unit.

B. Receiving Center Responsibilities:

1. The receiving physician is responsible for the decision to accept the referring care provider's request for transport and make preparations at the receiving center. If unable to accept the transport, assistance will be provided to the referring physician in locating appropriate care.
2. The receiving physician begins shared responsibility for the patient upon initial consultation and acceptance for transfer. Full responsibility begins with admission to the receiving center.
3. Every patient accepted by the receiving center should be seen by a physician within 30 minutes of arrival.

4. Communication with the referring care provider should occur following admission.
5. If the patient is discharged undelivered, communication should occur prior to the time of discharge.
6. A discharge summary of both mother and/or infant should be sent to the referring care provider.
7. The patient should be returned to the care of the referring care provider as soon as possible, taking care not to separate the mother and infant if that situation can be avoided.

III. OUTPATIENT REFERRAL

A. Referring Center Responsibilities:

1. Outpatient referral should begin with a phone call from the referring care provider to the receiving physician.
2. A convenient time for evaluation of the patient at the receiving center should be arranged.

B. Receiving Center Responsibilities:

1. The referring care provider should be contacted by either telephone or letter.
2. Whenever possible, patients should continue under the care of the referring care provider.

MATERNAL TRANSPORT PERSONNEL

I. The composition of the transport team should be decided jointly by the referring and receiving care providers based on the condition of the mother and/or fetus.

II. The transport team members should be selected from appropriately trained health care providers.

III. Transport team members should have the collective expertise sufficient to provide the following, if necessary:

A. monitoring of blood pressure, uterine contractions, deep tendon reflexes, and fetal heart rate,
B. monitoring the administration of intravenous infusions and usage of tocolytic, antihypertensive, and anticonvulsant medications,
C. care for a wide variety of emergency conditions including delivery and neonatal resuscitation.

IV. Transport team members should be familiar with the transport vehicle and usage of transport equipment.

V. In instances such as advanced labor, unstable maternal condition, or severe illness, it may become necessary for the referring care provider to accompany the patient during transport, if transport is still recommended by the receiving physician.

MATERNAL TRANSPORT VEHICLE

I. Selection of the transport vehicle should be a joint decision by the referring care provider and receiving physician(s) based on the condition of the mother and fetus.

II. Maternal transport can be accomplished by private vehicle, ambulance, rotary wing aircraft (RWA), or fixed wing aircraft (FWA). The ambulance (land and air) must be licensed by the Emergency Medical Services Division of the Tennessee Department of Health or sanctioned by Tennessee statute.

III. If care en route is necessary, at least a Basic Life Support (BLS) ambulance is required for maternal transport. The description of a BLS ambulance is defined by the Tennessee Department of Health and may be located in the Tennessee Emergency Medical Services Statutes and Rules, latest edition.

MATERNAL TRANSPORT EQUIPMENT

I. Standard equipment available in BLS ambulances is generally adequate for a majority of maternal transports. The referring health care provider should be familiar with the availability of BLS and Advanced Life Support (ALS) ambulances in the area. The required equipment and supplies for maternal and neonatal care in a BLS ambulance are defined by the Tennessee Department of Health (EMS Board Rules).

II. Organization and maintenance of additional transport equipment is the responsibility of the transport team.

III. Additional equipment and supplies that may be necessary include:

A. fetoscope/doppler
B. reflex hammer
C. infusion pump
D. medications:

1. Pitocin (oxytocin)
2. Methergine (methylergonovine)
3. magnesium sulfate
4. calcium gluconate
5. antenatal corticoid steroid preparation
6. antibiotic prophylaxis medications
7. misoprostol
8. terbutaline sulfate

E. oxygen masks (premature and newborn size)
F. infant positive pressure bag and mask with optional CO_2 detector
G. suction catheters (#6, #8, and #10 Fr)
H. latex free equipment and supplies should be available, when possible.

MATERNAL REFERRAL DOCUMENTATION

I. Records are essential for continuing care of the patient and evaluation of the referral process. Both the referring and receiving centers have responsibilities to provide adequate documentation of clinical data.

II. REFERRING CENTER RESPONSIBILITIES:

A. The following documents should accompany the transported patient:

1. copy of complete prenatal record
2. copy of current medical record
3. a completed maternal referral form (example in Appendix I)
4. a completed maternal transport worksheet (example in Appendix II)

B. The referring center should maintain a record regarding disposition of transported mothers.

III. RECEIVING CENTER RESPONSIBILITIES:

A. maintain a record of consultation/referral calls
B. maintain a record regarding the disposition of the transported patient
C. send a discharge summary of both mother and/or infant to the referring care provider

EVALUATION OF PERINATAL REFERRAL PROCESS

I. Interhospital care of the high-risk perinatal patient requires the cooperation and coordination of many skilled persons. Outreach education efforts should include discussions of the regional referral process and can be used to reinforce cooperation and coordination.

II. Outreach education related to transport should focus on the following objectives:

A. informing perinatal care and EMS providers in the region of specialized resources available through the perinatal network.
B. assisting perinatal care providers in developing their abilities to identify high-risk perinatal patients, anticipate complications, and stabilize those patients before transport.
C. continuing quality improvement through ongoing education of perinatal care providers and EMS providers.

III. Planning of the perinatal referral process requires participation of those who will use the service and those who will provide it. Criteria considered in planning and evaluating the referral process are:

A. availability
B. accessibility
C. responsiveness
D. effectiveness

IV. Referring facilities should periodically review their maternal referrals with or without the assistance of the receiving center.

NEONATAL TRANSPORT

Level I

LEVEL I UNITS:

Level I units provide basic care for uncomplicated maternity and neonatal patients. All high-risk mothers and neonates must be promptly identified for referral and/or consultation for more specialized care. The Level I unit shall provide equipment and staff to care for maternity patients whose onset of labor occurs after 34 completed weeks, for neonates whose birthweight is over 2000 grams, and for sick patients pending transfer to another hospital. The Level I unit must also provide care for convalescing neonates who are transferred from other institutions to be closer to home.

INDICATIONS FOR NEONATAL CONSULTATION AND/OR TRANSPORT

I. Requirement for more than routine care as prescribed for normal neonates as published in the most recent edition of Guidelines for Perinatal Care (American Academy of Pediatrics and American College of Obstetricians and Gynecologists).

II. Gestational age <34 weeks or birthweight <2000 gm

III. Apgar score 0 at 1 or 5 minutes, and/or <7 at 10 minutes

IV. Need for oxygen therapy after birth.

V. Abnormal respirations with or without need for supplemental oxygen

VI. Requirement for continuous intravenous therapy

VII. Suspected sepsis

VIII. Suspected congenital heart disease

IX. Neurologic disorder

X. Gastrointestinal disorder

XI. Genitourinary disorder

XII. Hematologic disorder

XIII. Musculoskeletal disorder

XIV. Endocrine or metabolic disorder

XV. Congenital malformation or suspected genetic disorder requiring further evaluation.

NEONATAL REFERRAL PROCESS

I. Neonatal transport is initiated by the health care provider responsible for the patient's medical care. Guidelines for the referral process are outlined below.

II. REFERRING CENTER RESPONSIBILITIES:

A. The referring health care provider's decision to request consultation is the first step in the referral process.

B. Telephone consultation with the receiving physician is necessary to initiate the referral process and to prepare the receiving center. This consultation may aid the referring health care provider in developing a treatment plan for stabilizing the patient before transport.

C. A discussion between the referring health care provider and receiving physician regarding the neonate will result in one of three possible dispositions.

1. Required neonatal care can be provided at the referring center. The receiving physician under these circumstances has only a consultative role.
2. The neonate requires further observation, investigation, or other preparation before possible transport. Continued contact between the providers is necessary.
3. Transport of the neonate is necessary. The optimal time, mode of transfer, transport personnel, and additional information regarding the neonate should be discussed. The process of stabilization of the neonate at the referring center should be reviewed and documented.

D. If the neonate is transported by the referring center, the referring health care provider is responsible for the patient until arrival at the receiving center.

E. If the neonate is transported by the receiving center, the referring health care provider is responsible for the patient until the arrival of the transport team. While the transport team is stabilizing the patient in the referring center, there is shared responsibility. The patient becomes the full responsibility of the transport team when leaving the referring center.

F. The medical record should be organized as the patient is prepared for transport.

G. Consent forms to authorize transfer, treatment, and admission to the receiving center must be obtained.

H. Parents should be encouraged to see and touch the infant. Photographs of the infant should be provided to parents, if culturally appropriate.

I. Appropriate maternal/neonatal identification should be in place before transport.

J. All referrals should be directly admitted to the receiving neonatal unit to avoid unnecessary delays in the emergency room.

III. RECEIVING CENTER RESPONSIBILITIES:

A. The receiving physician is responsible for the decision to accept the referring health care provider's request for transport and make preparations at the receiving center.

If unable to accept the transport, assistance will be provided to the referring health care provider in locating appropriate care.

B. If the neonate is transported by the referring center, the receiving physician begins shared responsibility for the patient upon initial consultation and acceptance for transfer. Full responsibility begins with admission to the receiving center.

C. If the neonate is transported by the receiving center, the referring health care provider is responsible for the patient until the arrival of the transport team. While the transport team is stabilizing the patient in the referring center nursery, there is shared responsibility. The patient becomes the full responsibility of the transport team when leaving the referring center.

D. If a delay in transport occurs, a repeat telephone call should be made for further assessment and advice.

E. On arrival of the transport team, assessment and further stabilization of the neonate should be done in conjunction with the referring staff.

F. The transport team must verify proper identification of the neonate before transport.

G. Following stabilization of the neonate, the transport team should communicate with the parents to assure their understanding of the infant's condition, possible course, and therapeutic intervention that has been undertaken or anticipated. Information about the receiving center should be provided to the parents.

H. Consent forms to authorize transfer, treatment, and admission to the receiving hospital must be obtained.

I. Parents should be encouraged to see and touch the infant before departure. Photographs of the infant should be provided to parents, if culturally appropriate.

J. Before departure, the transport team should communicate with receiving center personnel regarding the neonate's history, current status, and planned management during transport.

K. Before arrival at the receiving center, the transport team should communicate the status of the neonate and anticipated needs on admission.

L. A telephone call should be made to the parents shortly following admission of the neonate.

M. Within 24 hours of admission, communication with referring center personnel regarding events during transport and since admission should occur.

N. Periodic communication with the referring health care provider should be maintained.

O. The patient should be returned to the care of the referring health care provider as soon as possible.

P. Upon discharge of the infant, a discharge summary should be sent to the referring health care provider.

NEONATAL TRANSPORT PERSONNEL

I. The composition of the transport team should be decided jointly by the referring health care provider and receiving physician based on the condition of the neonate. In most instances neonates requiring Level III care should be transported by a team meeting Level III guidelines.

II. Transport team members should be selected from appropriately trained health care providers.

III. Transport team members should have the collective expertise sufficient to provide:

A. observation of the neonate throughout the transport.
B. monitoring of body temperature, respiratory status, and cardiovascular status.
C. delivery and monitoring of oxygen therapy.
D. supportive care for a wide variety of emergency conditions, including positive pressure ventilation.

IV. At least one member of the transport team should be a current **N**eonatal **R**esuscitation **P**rogram (American Academy of Pediatrics and American Heart Association) provider.

V. Transport team members should be familiar with the transport vehicle and use of transport equipment.

VI. The knowledge and skills required for a nurse to perform neonatal transport are listed in the most current edition of the Educational Objectives for Nurses, Levels I, II, III, Neonatal Transport Tennessee Perinatal Care System, Tennessee Department of Health, Maternal and Child Health Section (Appendix III).

NEONATAL TRANSPORT VEHICLE

I. Selection of the transport vehicle should be a joint decision by the referring health care provider and receiving physician based on the condition of the neonate.

II. The ambulance used for neonatal transport must meet the guidelines set forth by the EMS Division of Tennessee Department of Health for an ALS ambulance.

III. The ambulance used for neonatal transport should provide:

A. secure fixation of the transport incubator
B. secure fastening of other equipment, including oxygen and air tanks
C. an independent power source using an inverter or generator to allow uninterrupted and fail-safe operation of the incubator and other supportive equipment
D. adapters required for connections to the ambulance power source.

NEONATAL TRANSPORT EQUIPMENT

I. Organization and maintenance of neonatal transport equipment is the responsibility of the transporting facility.

II. Equipment to maintain a neutral thermal environment for the neonate should include:

A. transport incubator
B. thermometer
C. blanket, insulating blanket, or chemically activated heat pack (appropriate for neonatal use)

III. The transport incubator should meet the following requirements:

A. approval by the manufacturer for use during transport and installation in the transport vehicle with crashworthy restraints.
B. a heat source requiring minimal time for preheating and maintenance of ambient temperature within the desired range of 29^{o} to 36^{o} C. The temperature control should be readily accessible and easy to operate, and there should be provision for easy determination of ambient temperature. It is essential to have a fail-safe alarm system that will recognize overheating or underheating.
C. an environment in which the oxygen supply is constant and controllable.
D. unrestricted visibility of the neonate and a functional independent light source for general illumination should be provided in or on the incubator.
E. easy accessibility to the neonate resulting in minimal interference with thermal protection and oxygen supply.
F. safety restraint devices to secure the neonate inside the incubator.

IV. Equipment for oxygen delivery should include:

A. oxygen tanks
B. pressure gauge(s)
C. flow meter
D. oxygen tubing and adapters
E. neonatal oxygen mask
F. neonatal resuscitation bag and mask with optional CO_2 detector

V. A sufficient oxygen supply must be available with surplus to cover unexpected needs and delays of transport. An oxygen cylinder usage chart may be used in determining the number and type of oxygen cylinders necessary during transport (Appendix IV).

VI. Devices to maintain the patency of the airway and gastric decompression must be readily available and should include:

A. bulb syringe
B. regulated suction with gauge
C. suction catheters (#6, 8, 10 Fr)

D. feeding tube (#8 Fr) with a 20 mL syringe

VII. Every transported neonate should have continuous heart rate surveillance with a monitor. A neonatal stethoscope must be readily available.

VIII. Equipment and supplies for resuscitation should include:

A. Endotracheal intubation

1. laryngoscope handle with blades (#0,1)
2. laryngoscope spare bulbs
3. laryngoscope spare batteries
4. endotracheal tubes (#2.5, 3.0, 3.5, 4.0 mm ID)
5. disposable stylet (#6 Fr)
6. adhesive tape
7. scissors

B. Intravenous infusion supplies

1. intravenous needles or catheters (#22, 23, 24, 25, 26 gauge)
2. syringes (1, 3, 6, 12, 20, 35 mL)
3. intravenous armboard
4. intravenous tubing
5. infusion device
6. tape
7. alcohol preps
8. Betadine preps

C. Medications

1. dextrose solution (10%)
2. epinephrine (1:10,000)
3. normal saline
4. sodium bicarbonate (4.2%)

IX. Equipment for handwashing and personal protection should include:

A. antiseptic solution or towelettes
B. gloves
C. full face protection or goggles and masks
D. fluid-retardant and fluid-resistant gowns
E. soiled linen disposal bags
F. infectious waste disposal bags
G. secured sharps box

X. Latex free equipment and supplies should be available, when possible.

NEONATAL REFERRAL DOCUMENTATION

I. Records are essential for continuing care of the patient and evaluation of the referral process. Both referring and receiving center personnel have responsibilities to provide adequate documentation of clinical data.

II. REFERRING CENTER RESPONSIBILITIES:

A. The following documents should accompany the transported neonate:

1. copy of complete maternal prenatal record
2. copy of current maternal medical record
3. copy of current neonatal medical record
4. a completed neonatal referral history form (example in Appendix V)
5. a completed neonatal transport worksheet (example in Appendix VI)

B. The referring center should maintain a record regarding disposition of transferred neonates.

III. RECEIVING CENTER RESPONSIBILITIES:

A. maintain a record of consultation/referral calls
B. maintain a record regarding the disposition of the transported neonate
C. send a discharge summary to the referring health care provider

EVALUATION OF NEONATAL REFERRAL PROCESS

I. Interhospital care of the high-risk neonate requires the cooperation and coordination of many skilled persons. Outreach education efforts should include discussions of the regional referral process and can be used to reinforce cooperation and coordination.

II. Outreach education related to transport should focus on the following objectives:

A. informing perinatal care and EMS providers in the region of specialized resources available to them through the perinatal network.
B. assisting neonatal care providers in developing their abilities to identify high-risk neonatal patients, anticipate complications, and stabilize those patients before transport.
C. continuing quality improvement through ongoing education of neonatal care providers and EMS providers.

III. Planning of the neonatal referral process requires participation of those who will use the service and those who will provide it. Criteria considered in planning and evaluating the referral process are:

A. availability
B. accessibility
C. responsiveness
D. effectiveness

IV. Referring facilities should periodically review their neonatal referrals, with or without the assistance of the receiving center.

LEVEL II FACILITIES

MATERNAL TRANSPORT

Level II

LEVEL II-A UNITS:

Level II-A units provide care for maternal and neonatal patients whose courses are uncomplicated, and for patients with mild obstetric and neonatal illnesses who do not require specialized services. The nursery must have equipment and personnel to provide controlled thermal environments, hood oxygen for protracted management, and assisted neonatal ventilation pending transfer to another institution for more specialized care. Obstetric and pediatric co-directors are board certified (or eligible) in their respective specialties.

LEVEL II-B UNITS:

Level II-B units are capable of managing more complex maternal and neonatal abnormalities such as deliveries prior to 34 gestational weeks, care of neonates that requires umbilical vessel catheters and protracted mechanical ventilation. In exceptional circumstances, the Level II-B unit may receive patients transferred from Level I and Level II-A institutions. The obstetric co-director is board certified (or eligible) in that specialty. The pediatric co-director is board certified (or eligible) in neonatal-perinatal medicine.

INDICATIONS FOR MATERNAL CONSULTATION AND/OR TRANSPORT

I. ANTEPARTUM

A. Maternal History

1. preterm labor (<37 weeks) or low-birthweight neonate (<2500 gm)
2. previous neonate >4000 gm at term or any large-for-gestational age neonate
3. previous stillbirth, neonatal loss, or two or more abortions
4. suspected insufficient cervix
5. medical indication for termination of previous pregnancy
6. diagnosed abnormality of the genital tract
7. neonate who required more than routine observation or care
8. neonate with known or suspected genetic disorder
9. severe emotional problems associated with previous pregnancy or delivery
10. previous vertical or classical uterine incision
11. age <16 or advanced maternal age ($\geq$ 35 years of age at delivery)
12. prepregnancy weight <45 kg or >90 kg
13. height <150 cm

B. Medical/Surgical Complications

1. diabetes mellitus/endocrine disorder
2. autoimmune disorder
3. cardiac disease
4. hypertension
5. pulmonary disease
6. renal disease
7. hematologic disorder
8. neurologic disorder
9. musculoskeletal disorder
10. infection
11. nutritional disorder
12. substance use
13. malignancy
14. psychiatric disorder
15. trauma
16. surgical emergency

C. Obstetric Complications

1. glucose intolerance
2. urinary tract infection

3. sexually transmitted disease
4. suspected ectopic pregnancy
5. suspected missed abortion
6. hyperemesis
7. exposure to teratogen
8. isoimmunization
9. persistent anemia
10. vaginal bleeding
11. preeclampsia/eclampsia
12. suspected polyhydramnios or oligohydramnios
13. preterm cervical dilatation without uterine activity
14. preterm rupture of membranes with or without uterine activity
15. rupture of membranes at term for more than 12 hours without labor and/or evidence of amnionitis or sepsis at any time
16. suspected feto-pelvic disproportion
17. inappropriate fetal growth for gestational age
18. multiple gestation
19. postterm gestation (>42 weeks)
20. fetal demise
21. known or suspected fetal anomaly
22. abnormal triple screen

II. INTRAPARTUM

A. preterm (<37 weeks) cervical dilatation with uterine contractions
B. abnormal presentation
C. suspected feto-pelvic disproportion
D. dysfunctional labor
E. rupture of membranes at term for more than 12 hours and/or evidence of amnionitis or sepsis at any time
F. abnormal bleeding
G. suspected nonreassuring fetal status
H. preeclampsia/eclampsia
I. uterine hyperstimulation syndrome
J. meconium in amniotic fluid
K. multiple gestation

III. POSTPARTUM

A. preeclampsia/eclampsia
B. sepsis
C. abnormal bleeding
D. thromboembolic disease
E. cardiopulmonary dysfunction
F. neonatal transport

MATERNAL REFERRAL PROCESS

I. Maternal transport is initiated by the health care provider responsible for the patient's medical care. Maternal referral may lead to admission of the patient to the receiving hospital (inpatient transport) or to outpatient evaluation and management (outpatient transport). The guidelines for the referral process are outlined below.

II. INPATIENT TRANSPORT

A. Referring Center Responsibilities:

1. The decision by the referring care provider (physician, certified nurse midwife, nurse practitioner) to request consultation is the first step in the referral process.
2. Telephone consultation with the receiving physician is necessary to initiate the referral process and to prepare the receiving center. This consultation may aid the care provider in developing a treatment plan for stabilizing the patient before and during transport.
3. The referring care provider is responsible for the patient until arrival at the receiving center.
4. An ambulance is the most appropriate vehicle for the majority of maternal transports. If an alternate form of transportation is being considered, the referring physician should discuss this alternative with the receiving physician at the time of consultation.
5. The medical record should be organized as the patient is prepared for transport.
6. The composition of the transport team should be decided jointly by the referring and receiving care providers based on the condition of the mother and fetus.
7. To avoid unnecessary delays in the emergency room or admitting office, all referrals should be directly admitted to the receiving obstetric unit.

B. Receiving Center Responsibilities:

1. The receiving physician is responsible for the decision to accept the referring care provider's request for transport and making preparations at the receiving center. If unable to accept the transport, assistance will be provided to the referring physician in locating appropriate alternative care.
2. The receiving physician begins shared responsibility for the patient upon initial consultation and acceptance for transfer. Full responsibility begins with admission to the receiving center.
3. Every patient accepted by the receiving center should be seen by a physician within 30 minutes of arrival.
4. A telephone call should be made to the referring care provider after admission.
5. If the patient is discharged undelivered, a phone call should be made to the

referring care provider at the time of discharge.

6. A discharge summary of both mother and infant should be sent to the referring care provider.
7. The patient should be returned to the care of the referring physician as soon as possible, taking care not to separate the mother and infant if that situation can be avoided.

III. OUTPATIENT REFERRAL

A. Referring Center Responsibilities:

1. Outpatient referral should begin with a phone call from the referring care provider to the receiving physician.
2. A convenient time for evaluation of the patient at the receiving center should be arranged.

B. Receiving Center Responsibilities:

1. The referring care provider should be contacted by either telephone or letter.
2. Whenever possible, patients should continue under the care of the referring care provider.

MATERNAL TRANSPORT PERSONNEL

I. The composition of the transport team should be decided jointly by the referring and receiving care providers based on the condition of the mother and fetus.

II. The transport team members should be selected from appropriately trained physicians, certified nurse midwives, licensed nurses, emergency medical technicians, and paramedics.

III. Transport team members should have the collective expertise sufficient to provide:

A. monitoring of blood pressure, uterine contractions, deep tendon reflexes, and fetal heart rate.
B. monitoring the administration of intravenous infusions and usage of tocolytic, antihypertensive, and anticonvulsant medications.
C. care for a wide variety of emergency conditions including delivery and neonatal resuscitation.

IV. Transport team members should be familiar with the transport vehicle and usage of transport equipment.

V. In instances such as advanced labor, unstable maternal condition, or severe illness, it may become necessary for the referring physician to accompany the patient during transport, if transport is still recommended by the receiving physician.

MATERNAL TRANSPORT VEHICLE

I. Selection of the transport vehicle should be a joint decision by the referring and receiving physicians based on the condition of the mother and fetus.

II. Maternal transport can be accomplished by private vehicle, ambulance, rotary wing aircraft (RWA), or fixed wing aircraft (FWA). The use of a private vehicle, RWA or FWA for maternal transport must be individualized. The ambulance (land and air) must be licensed by the Emergency Medical Services Division of the Tennessee Department of Health.

III. If care en route is necessary, at least a Basic Life Support (BLS) ambulance is required for maternal transport. The description of a BLS ambulance is defined by the Tennessee Department of Health and may be located in the Tennessee Emergency Medical Services Statutes and Rules, latest edition.

MATERNAL TRANSPORT EQUIPMENT

I. Standard equipment available in BLS ambulances is generally adequate for a majority of maternal transports. The referring physician should be familiar with the availability of BLS and Advanced Life Support (ALS) ambulances in his area. The required equipment and supplies for maternal and neonatal care in a BLS and ALS ambulance are defined by the Tennessee Department of Health (EMS Board Rules).

II. Organization and maintenance of additional transport equipment is the responsibility of the transport team.

III. Additional equipment that may be necessary includes:

A. fetoscope/doppler
B. reflex hammer
C. infusion pump
D. medications:

1. Pitocin (oxytocin)
2. Methergine (methylergonovine)
3. magnesium sulfate
4. calcium gluconate
5. antenatal corticoid steroid preparation
6. antibiotic prophylaxis medications
7. misoprostol
8. terbutaline sulfate

E. oxygen masks (premature and newborn size)
F. infant positive pressure bag and mask with optional CO_2 detector
G. suction catheter (#6, 8, and 10 Fr)

IV. Latex free equipment and supplies should be available, when possible.

MATERNAL REFERRAL DOCUMENTATION

I. Records are essential for continuing care of the patient and evaluation of the referral process. Both the referring and receiving centers have responsibilities to provide adequate documentation of clinical data.

II. REFERRING CENTER RESPONSIBILITIES:

A. The following documents should accompany the transported patient:

1. copy of complete prenatal record
2. copy of completed current medical and transport record
3. a completed maternal referral form (example in Appendix I)
4. a completed maternal transport worksheet (example in Appendix II)

B. The referring center should maintain a record regarding disposition of transported mothers.

III. RECEIVING CENTER RESPONSIBILITIES:

A. maintain a record of consultation/referral calls
B. maintain a record regarding the disposition of the transported patient
C. send a discharge summary of both mother and/or infant to the referring care provider

EVALUATION OF PERINATAL REFERRAL PROCESS

I. Interhospital care of the high-risk perinatal patient requires the cooperation and coordination of many skilled persons. Outreach education efforts should include discussions of the regional referral process and can be used to reinforce cooperation and coordination.

II. Outreach education related to transport should focus on the following objectives:

A. informing perinatal care and EMS providers in the region of specialized resources available through the perinatal network.
B. assisting perinatal care providers in developing their abilities to identify high-risk perinatal patients, anticipate complications, and stabilize those patients before transport.
C. continuing quality improvement through ongoing education of perinatal care providers and EMS providers.

III. Planning of the perinatal referral process requires participation of those who will use the service and those who will provide it. Criteria considered in planning and evaluating the referral process are:

A. availability
B. accessibility
C. responsiveness
D. effectiveness

IV. Referring facilities should periodically review their maternal referrals with or without the assistance of the receiving center.

NEONATAL TRANSPORT

Level II

LEVEL II-A UNITS:

Level II-A units provide care for maternal and neonatal patients whose courses are uncomplicated, and for patients with mild obstetric and neonatal illnesses who do not require specialized services. The nursery must have equipment and personnel to provide controlled thermal environments, hood oxygen for protracted management, and assisted neonatal ventilation pending transfer to another institution for more specialized care. Obstetric and pediatric co-directors are board certified (or eligible) in their respective specialties.

LEVEL II-B UNITS:

Level II-B units are capable of managing more complex maternal and neonatal abnormalities such as deliveries prior to 34 gestational weeks, care of neonates that requires umbilical vessel catheters and protracted mechanical ventilation. In exceptional circumstances, the Level II-B unit may receive patients transferred from Level I and Level II-A institutions. The obstetric co-director is board certified (or eligible) in that specialty. The pediatric co-director is board certified (or eligible) in neonatal-perinatal medicine.

INDICATIONS FOR NEONATAL CONSULTATION AND/OR TRANSPORT

I. LEVEL II-A (WITHOUT NEONATOLOGIST ON STAFF)

A. gestational age ≤32 weeks or birthweight ≤1500 gm
B. post-asphyxial complications
C. requirement for ventilatory assistance beyond the delivery room
D. requirement for total parenteral nutrition
E. complicated sepsis or meningitis
F. suspected congenital heart disease
G. neurologic disorder
H. gastrointestinal disorder
I. genitourinary disorder
J. hematologic disorder
K. musculoskeletal disorder
L. endocrine or metabolic disorder
M. congenital malformation or suspected genetic disorder requiring further evaluation

II. LEVEL II-B (WITH NEONATOLOGIST ON STAFF)

A. gestational age <28 weeks or birthweight <1000 gm
B. severity of illness requiring a level of care that exceeds the capacity of the level II-B facility

NEONATAL REFERRAL PROCESS

I. Neonatal transport is initiated by the health care provider responsible for the patient's medical care. Guidelines for the referral process are outlined below.

II. REFERRING CENTER RESPONSIBILITIES:

A. The referring health care provider's decision to request consultation is the first step in the referral process.

B. Telephone consultation with the receiving physician is necessary to initiate the referral process and to prepare the receiving center. This consultation may aid the referring health care provider in developing a treatment plan for stabilizing the patient before transport.

C. A discussion between the referring health care provider and receiving physician regarding the neonate will result in one of three possible dispositions.

1. Required neonatal care can be provided at the referring center. The receiving physician under these circumstances has only a consultative role.
2. The neonate requires further observation, investigation, or other preparation before possible transport. Continued contact between the providers is necessary.
3. Transport of the neonate is necessary. The optimal time, mode of transfer, transport personnel, and additional information regarding the neonate should be discussed. The process of stabilization of the neonate at the referring center should be reviewed and documented.

D. If the neonate is transported by the referring center, the referring health care provider is responsible for the patient until arrival at the receiving center.

E. If the neonate is transported by the receiving center, the referring health care provider is responsible for the patient until the arrival of the transport team. While the transport team is stabilizing the patient in the referring center, there is shared responsibility. The patient becomes the full responsibility of the transport team when leaving the referring center.

F. The medical record should be organized as the patient is prepared for transport.

G. Consent forms to authorize transfer, treatment, and admission to the receiving center must be obtained.

H. Parents should be encouraged to see and touch the infant. Photographs of the infant should be provided to parents, if culturally appropriate.

I. Appropriate maternal/neonatal identification should be in place before transport.

J. All referrals should be directly admitted to the receiving neonatal unit to avoid unnecessary delays in the emergency room.

III. RECEIVING CENTER RESPONSIBILITIES:

A. The receiving physician is responsible for the decision to accept the referring health care provider's request for transport and make preparations at the receiving center.

If unable to accept the transport, assistance will be provided to the referring health care provider in locating appropriate care.

B. If the neonate is transported by the referring center, the receiving physician begins shared responsibility for the patient upon initial consultation and acceptance for transfer. Full responsibility begins with admission to the receiving center.

C. If the neonate is transported by the receiving center, the referring health care provider is responsible for the patient until the arrival of the transport team. While the transport team is stabilizing the patient in the referring center nursery, there is shared responsibility. The patient becomes the full responsibility of the transport team when leaving the referring center.

D. If a delay in transport occurs, a repeat telephone call should be made for further assessment and advice.

E. On arrival of the transport team, assessment and further stabilization of the neonate should be done in conjunction with the referring staff.

F. The transport team must verify proper identification of the neonate before transport.

G. Following stabilization of the neonate, the transport team should communicate with the parents to assure their understanding of the infant's condition, possible course, and therapeutic intervention that has been undertaken or anticipated. Information about the receiving center should be provided to the parents.

H. Consent forms to authorize transfer, treatment, and admission to the receiving hospital must be obtained.

I. Parents should be encouraged to see and touch the infant before departure. Photographs of the infant should be provided to parents, if culturally appropriate.

J. Before departure, the transport team should communicate with receiving center personnel regarding the neonate's history, current status, and planned management during transport.

K. Before arrival at the receiving center, the transport team should communicate the status of the neonate and anticipated needs on admission.

L. A telephone call should be made to the parents shortly following admission of the neonate.

M. Within 24 hours of admission, communication with referring center personnel regarding events during transport and since admission should occur.

N. Periodic communication with the referring health care provider should be maintained.

O. The patient should be returned to the care of the referring health care provider as soon as possible.

P. Upon discharge of the infant, a discharge summary should be sent to the referring health care provider.

NEONATAL TRANSPORT PERSONNEL

I. The composition of the transport team should be decided jointly by the referring health care provider and receiving physician(s) based on the condition of the neonate. In most instances neonates requiring level III care should be transported by a team meeting level III guidelines.

II. Transport team members should be selected from appropriately trained physicians, physician assistants, registered nurses, neonatal nurse practitioners, respiratory therapists, emergency medical technicians, and paramedics.

III. Transport team members should have the collective expertise sufficient to provide:

A. observation of the neonate throughout the transport.
B. monitoring of body temperature, respiratory status and cardiovascular status.
C. delivery and monitoring of oxygen therapy.
D. positive pressure ventilation, using either a face mask or endotracheal tube.
E. supportive care for a wide variety of emergency conditions.

IV. At least one member of the transport team should be a current **N**eonatal **R**esuscitation **P**rogram (American Academy of Pediatrics and American Heart Association) provider.

V. Transport team members should be familiar with the transport vehicle and use of transport equipment.

VI. The knowledge and skills required for a nurse to perform neonatal transport are listed in the most current edition of the Educational Objectives for Nurses, Levels I, II, III, Neonatal Transport Tennessee Perinatal Care System, Tennessee Department of Health, Maternal and Child Health Section (Appendix III).

NEONATAL TRANSPORT VEHICLE

I. Selection of the transport vehicle should be a joint decision by the referring health care provider and receiving physician based on the condition of the neonate.

II. The ambulance used for neonatal transport must be licensed by the EMS Division of the Tennessee Department of Health at least as an ALS ambulance.

III. The ambulance used for neonatal transport should provide:

A. secure fixation of the transport incubator.
B. secure fastening of other equipment, including oxygen and air tanks.
C. an independent power source using an inverter or generator to allow uninterrupted and fail-safe operation of the incubator and other supporting equipment.
D. adapters required for connections to the ambulance power source.

IV. If using a RWA or FWA, see page 54, Section III (Level III, Neonatal Transport Vehicle).

NEONATAL TRANSPORT EQUIPMENT

I. Organization and maintenance of neonatal transport equipment is the responsibility of the transporting facility.

II. Equipment to maintain a neutral thermal environment for the neonate should include:

A. transport incubator
B. thermometer
C. blanket, insulating blanket, or chemically activated heat pack (appropriate for neonatal use)

III. The transport incubator should meet the following requirements:

A. approval by the manufacturer for use during transport and installation in the transport vehicle with crashworthy restraints.
B. a heat source requiring minimal time for preheating and maintenance of ambient temperature within the desired range of 29^{o} to 36^{o} C. The temperature control should be readily accessible and easy to operate, and there should be provision for easy determination of ambient temperature. It is essential to have a fail-safe alarm system that will recognize overheating or underheating.
C. an environment in which the oxygen supply is constant and controllable.
D. unrestricted visibility of the neonate and a functional independent light source for general illumination should be provided in or on the incubator.
E. easy accessibility of the neonate resulting in minimal interference with thermal protection and oxygen supply.
F. safety restraint devices to secure the neonate inside the incubator.

IV. Equipment for oxygen delivery should include:

A. oxygen and air tanks
B. pressure gauge(s)
C. flow meter
D. oxygen analyzer
E. oxygen blending device
F. oxygen tubing and adapters
G. oxygen hood or nasal cannula
H. neonatal oxygen mask
I. neonatal resuscitation bag and mask with optional CO_2 detector

V. A sufficient oxygen supply must be available with surplus to cover unexpected needs and delays of transport. An oxygen cylinder usage chart may be used in determining the number and type of oxygen cylinders necessary during transport (Appendix IV).

VI. Devices to maintain the patency of the airway and gastric decompression must be readily available and should include:

A. bulb syringe
B. regulated suction with gauge
C. suction catheters (#6, 8, 10 Fr)
D. feeding tube (#8 Fr) with a 20 mL syringe

VII. Every transported neonate should have continuous heart rate surveillance with a monitor. A neonatal stethoscope must be readily available. Equipment for noninvasive blood pressure and oxygen monitoring must be available.

VIII. Equipment and supplies for resuscitation should include:

A. Endotracheal intubation

1. laryngoscope handle with blades (#0,1)
2. laryngoscope spare bulbs
3. laryngoscope spare batteries
4. endotracheal tubes (#2.5, 3.0, 3.5, 4.0 mm ID)
5. disposable stylet (#6 Fr)
6. adhesive tape
7. scissors

B. Intravenous infusion

1. intravenous needles or catheters (#22, 23, 24, 25, 26 gauge)
2. syringes (1, 3, 6, 12, 20, 35 mL)
3. intravenous armboard
4. intravenous tubing
5. infusion device
6. tape
7. alcohol preps
8. Betadine preps

C. Medications

1. dextrose solution (10%)
2. epinephrine (1:10,000)
3. normal saline
4. sodium bicarbonate (4.2%)

IX. Equipment for handwashing and personal protection should include:

A. antiseptic solution or towelettes
B. gloves
C. full face protection or goggles and masks
D. fluid-retardant and fluid-resistant gowns

E. soiled linen disposal bags
F. infectious waste disposal bags
G. secured sharps box

X. Latex free equipment and supplies should be available, when possible.

NEONATAL REFERRAL DOCUMENTATION

I. Records are essential for continuing care of the patient and evaluation of the referral process. Both referring and receiving center personnel have responsibilities to provide adequate documentation of clinical data.

II. REFERRING CENTER RESPONSIBILITIES:

A. The following documents should accompany the transported neonate:

1. copy of complete maternal prenatal record
2. copy of current maternal medical record
3. copy of current neonatal medical record
4. a completed neonatal referral history form (example in Appendix V)
5. a completed neonatal transport worksheet (example in Appendix VI)

B. The referring center should maintain a record regarding disposition of transported neonates.

III. RECEIVING CENTER RESPONSIBILITIES:

A. maintain a record of consultation/referral calls
B. maintain a record regarding the disposition of the transported neonate
C. send a discharge summary to the referring health care provider

EVALUATION OF NEONATAL REFERRAL PROCESS

I. Interhospital care of the high-risk neonate requires the cooperation and coordination of many skilled persons. Outreach education efforts should include discussions of the regional referral process and can be used to reinforce cooperation and coordination.

II. Outreach education related to transport should focus on the following objectives:

A. informing perinatal care and EMS providers in the region of specialized resources available to them through the perinatal network.
B. assisting neonatal care providers in developing their abilities to identify high-risk neonatal patients, anticipate complications, and stabilize those patients before transport.
C. continuing quality improvement through ongoing education of neonatal care providers and EMS providers.

III. Planning of the neonatal referral process requires participation of those who will use the service and those who will provide it. Criteria considered in planning and evaluating the referral process are:

A. availability
B. accessibility
C. responsiveness
D. effectiveness

IV. Referring facilities should periodically review their neonatal referrals with or without the assistance of the receiving center.

LEVEL III FACILITIES

MATERNAL TRANSPORT

Level III

LEVEL III UNITS:

Level III perinatal facilities provide care for severe and complicated disorders of maternal and neonatal patients as well as those who require normal or intermediate care. The responsibilities and capabilities that are prescribed for Level III facilities are solely concerned with the level of patient care. Designation as a Level III facility does not imply designation as a Regional Perinatal Center.

REGIONAL PERINATAL CENTERS:

Each of Tennessee's five Regional Perinatal Centers (Northeast Tennessee Regional Perinatal Center in Johnson City; East Tennessee Regional Perinatal Center in Knoxville; Southeast Tennessee Regional Perinatal Center in Chattanooga; Middle Tennessee Regional Perinatal Center in Nashville; and West Tennessee Regional Perinatal Center in Memphis) is capable of providing Level III obstetric and neonatal care.

In addition, each Regional Perinatal Center must provide the services of (a) consultation/referral; (b) professional education; (c) maternal-fetal and neonatal transport; (d) site visits upon request; (e) post-neonatal follow-up; and (f) data collection.

INDICATIONS FOR MATERNAL CONSULTATION AND/OR TRANSPORT

I. Maternal or fetal conditions requiring or potentially requiring specific medical or surgical services unavailable at the Level III facility. Such consultation/transfer may necessitate out of state consultation/transfer.

MATERNAL REFERRAL PROCESS

I. Maternal transport is initiated by the health care provider responsible for the patient's medical care. Maternal referral may lead to admission of the patient to the receiving hospital (inpatient transport) or to outpatient evaluation and management (outpatient transport). The guidelines for the referral process are outlined below.

II. INPATIENT TRANSPORT

A. Referring Center Responsibilities:

1. The decision by the referring care provider (physician, certified nurse midwife, nurse practitioner) to request consultation is the first step in the referral process.
2. Telephone consultation with the receiving physician is necessary to initiate the referral process and to prepare the receiving center. This consultation may aid the care provider in developing a treatment plan for stabilizing the patient before and during transport.
3. It is the referring facility's responsibility to follow the COBRA/EMTALA guidelines. (42 USC 1395dd. Section 1867 of the Social Security Act. Also known as Section 9121 of the Consolidated Omnibus Budget Reconciliation Act of 1985. See Appendix IX.)
4. The referring care provider is responsible for the patient until arrival at the receiving center.
5. A ground ambulance is the most appropriate vehicle for the majority of maternal transports. If an alternate form of transportation is being considered, the referring physician should discuss this alternative with the receiving physician at the time of consultation.
6. The medical record should be organized as the patient is prepared for transport.
7. The composition of the transport team should be a joint decision between the referring and receiving care providers based on the condition of the mother and fetus.
8. To avoid unnecessary delays in the emergency room or admitting office, all referrals should be directly admitted to the receiving obstetric unit.

B. Receiving Center Responsibilities:

1. The receiving physician is responsible for the decision to accept the referring care provider's request for transport and making preparations at the receiving center. If unable to accept the transport, assistance will be provided to the referring physician in locating appropriate alternative care.
2. The receiving physician begins shared responsibility for the patient upon initial consultation and acceptance for transfer. Full responsibility begins with admission to the receiving center.
3. Every patient accepted by the receiving center should be seen by a physician within 30 minutes of arrival.

4. Communication with the referring care provider should occur following admission.
5. If the patient is discharged undelivered, a phone call should be made to the referring care provider at the time of discharge.
6. A discharge summary of both mother and infant should be sent to the referring care provider.
7. The patient should be returned to the care of the referring physician as soon as possible, taking care not to separate the mother and infant if that situation can be avoided.

III. OUTPATIENT REFERRAL

A. Referring Center Responsibilities:

1. Outpatient referral should begin with a phone call from the referring care provider to the receiving physician.
2. A convenient time for evaluation of the patient at the receiving center should be arranged.

B. Receiving Center Responsibilities:

1. The referring care provider should be contacted by either telephone or letter.
2. Whenever possible, patients should continue under the care of the referring care provider.

MATERNAL TRANSPORT PERSONNEL

I. The composition of the transport team should be decided jointly by the referring and receiving care providers based on the condition of the mother and fetus.

II. The transport team members should be selected from appropriately trained physicians, certified nurse midwives, licensed nurses, emergency medical technicians, and paramedics.

III. The transport team members should have the collective expertise sufficient to provide:

A. monitoring of blood pressure, uterine contractions, deep tendon reflexes, and fetal heart rate.
B. monitoring the administration of intravenous infusions and usage of tocolytic, antihypertensive and anticonvulsant medications.
C. care for a wide variety of emergency conditions including delivery and neonatal resuscitation.

IV. The transport team members should be familiar with the transport vehicle and usage of transport equipment.

V. In instances such as advanced labor, unstable maternal condition, or severe illness, it may become necessary for the referring physician to accompany the patient during transport, if transport is still recommended by the receiving physician.

MATERNAL TRANSPORT VEHICLE

I. Selection of the transport vehicle should be a joint decision by the referring and receiving physicians based on the condition of the mother and fetus.

II. Maternal transport can be accomplished by private vehicle, ambulance, rotary wing aircraft (RWA), or fixed wing aircraft (FWA). The use of a private vehicle, RWA or FWA for maternal transport must be individualized. The ambulance (land and air) must be licensed by the Emergency Medical Services Division of the Tennessee Department of Health.

III. If care en route is necessary, at least a Basic Life Support (BLS) ambulance is required for maternal transport. The description of a BLS ambulance is defined by the Tennessee Department of Health and may be located in the Tennessee Emergency Medical Services Statutes and Rules, latest edition.

MATERNAL TRANSPORT EQUIPMENT

I. Standard equipment available in BLS ambulances is generally adequate for a majority of maternal transports. The referring physician should be familiar with the availability of BLS and Advanced Life Support (ALS) ambulances in the area. The required equipment and supplies for maternal and neonatal care in a BLS and ALS ambulance is defined by the Tennessee Department of Health (EMS Board Rules).

II. Organization and maintenance of additional transport equipment is the responsibility of the transport team.

III. Additional equipment that may be necessary includes:

A. fetoscope/doppler
B. reflex hammer
C. infusion pump
D. medications:

1. Pitocin (oxytocin)
2. Methergine (methylergonovine)
3. magnesium sulfate
4. calcium gluconate
5. antenatal corticoid steroid preparation
6. antibiotic prophylaxis medications
7. misoprostol
8. terbutaline sulfate

E. oxygen masks (premature and newborn size)
F. infant positive pressure bag and mask with optional CO_2 detector
G. suction catheter (#6, 8, and 10 Fr)

IV. Latex free equipment and supplies should be available, when possible.

MATERNAL REFERRAL DOCUMENTATION

I. Records are essential for the continuing care of the patient and for evaluation of the referral process. Both referring and receiving center personnel have responsibilities to provide adequate documentation of clinical data.

II. REFERRING CENTER RESPONSIBILITIES:

A. The following documents should accompany the transported patient:

1. copy of complete prenatal record
2. copy of current medical record
3. a completed maternal referral form (example in Appendix I)
4. a completed maternal transport worksheet (example in Appendix II)

B. The referring center should maintain a record regarding disposition of transported mothers.

III. RECEIVING CENTER RESPONSIBILITIES:

A. maintain a record of consultation/referral calls
B. maintain a record regarding the disposition of the transported patient
C. send a discharge summary of both mother and infant to the referring care provider

EVALUATION OF PERINATAL REFERRAL PROCESS

I. Interhospital care of the high-risk perinatal patient requires the cooperation and coordination of many skilled persons. Outreach education efforts should include discussions of the regional referral process and can be used to reinforce cooperation and coordination.

II. Outreach education related to transport should focus on the following objectives:

A. informing perinatal care and EMS providers in the region of specialized resources available through the perinatal network.
B. assisting perinatal care providers in developing their abilities to identify high-risk perinatal patients, anticipate complications, and stabilize those patients before transport.
C. continuing quality improvement through the ongoing education of perinatal care providers and EMS providers.

III. The planning of the perinatal referral process requires the participation of those who will use the service and those who will provide it. The criteria considered in planning and evaluating the referral process are:

A. availability
B. accessibility
C. responsiveness
D. effectiveness

IV. Referring facilities should periodically review their maternal referrals.

NEONATAL TRANSPORT

Level III

LEVEL III UNITS:

Level III perinatal units provide care for severe and complicated disorders of maternal and neonatal patients as well as those who require normal or intermediate care. The responsibilities and capabilities that are prescribed for Level III facilities are solely concerned with the level of patient care. Designation as a Level III facility does not imply designation as a Regional Perinatal Center.

REGIONAL PERINATAL CENTERS:

Each of Tennessee's five Regional Perinatal Centers (Northeast Tennessee Regional Perinatal Center in Johnson City; East Tennessee Regional Perinatal Center in Knoxville; Southeast Tennessee Regional Perinatal Center in Chattanooga; Middle Tennessee Regional Perinatal Center in Nashville; and West Tennessee Regional Perinatal Center in Memphis) is capable of providing Level III obstetric and neonatal care.

In addition, each Regional Perinatal Center must provide the services of (a) consultation/referral; (b) professional education; (c) maternal-fetal and neonatal transport; (d) site visits upon request; (e) post-neonatal follow-up; and (f) data collection.

INDICATIONS FOR NEONATAL CONSULTATION AND/OR TRANSPORT

I. Neonatal conditions requiring or potentially requiring specific medical or surgical services unavailable at the Level III facility. Such consultation/transfer may necessitate out of state consultation/transfer.

NEONATAL REFERRAL PROCESS

I. Neonatal transport is initiated by the health care provider responsible for the patient's medical care. Guidelines for the referral process are outlined below.

II. REFERRING CENTER RESPONSIBILITIES:

A. The referring physician's decision to request consultation is the first step in the referral process.

B. A phone consultation with the receiving physician is necessary to initiate the referral process and to prepare the receiving center. This consultation may aid the referring physician in developing a treatment plan for stabilizing the patient before transport.

C. A discussion between the referring and receiving physicians regarding the neonate will result in one of three possible dispositions.

1. Required neonatal care can be provided at the referring center. The receiving physician under these circumstances has only a consultative role.
2. The neonate requires further observation, investigation, or other preparation before possible transport. Continued contact between the physicians is necessary.
3. Transport of the neonate is necessary. The optimal time, mode of transfer, transport personnel, and additional information regarding the neonate should be discussed. The process of pre-transport stabilization of the neonate at the referring center should be reviewed.

D. If the neonate is transported by the referring center, the referring physician is responsible for the patient until arrival at the receiving center.

E. If the neonate is transported by the receiving center, the referring physician is responsible for the patient until the arrival of the transport team. While the transport team is stabilizing the patient in the referring center nursery, there is shared responsibility. The patient becomes the full responsibility of the transport team when leaving the referring center nursery.

F. The medical record should be organized as the patient is prepared for transport.

G. Consent forms to authorize transfer, treatment, and admission to the receiving center must be obtained.

H. A maternal blood sample, if requested, should be sent with the patient.

I. Parents should be encouraged to see and touch the infant. Photographs of the infant should be provided to the parents, if culturally appropriate.

J. Appropriate maternal/neonatal identification should be in place before transport.

K. All referrals should be directly admitted to the receiving neonatal unit to avoid unnecessary delays in the emergency room.

III. RECEIVING CENTER RESPONSIBILITIES:

A. The receiving physician is responsible for the decision to accept the referring physician's request for transport and making preparations at the receiving center. If unable to accept the transport, assistance will be provided to the referring physician in locating appropriate alternative care.

B. If the neonate is transported by the referring center, the receiving physician begins shared responsibility for the patient upon initial consultation and acceptance for transfer. Full responsibility begins with admission to the receiving center.

C. If the neonate is transported by the receiving center, the referring physician is responsible for the patient until the arrival of the transport team. While the transport team is stabilizing the patient in the referring center nursery, there is shared responsibility. The patient becomes the full responsibility of the transport team when leaving the referring center nursery.

D. If a delay in transport occurs, a repeat telephone call should be made for further assessment and advice.

E. On arrival of the transport team, assessment and further stabilization of the neonate should be done in conjunction with the referring staff.

F. The transport team must verify proper identification of the neonate before transport.

G. Following stabilization of the neonate, the transport team should communicate with the parents allowing them to improve their understanding of the infant's condition, possible course, and the therapeutic intervention that has been undertaken or anticipated. Information about the receiving center should be provided to the parents.

H. Consent forms to authorize transfer, treatment, and admission to the receiving center must be obtained.

I. Parents should be encouraged to see and touch the infant before departure. Photographs of the infant should be provided to the parents, if culturally appropriate.

J. Before departure, the transport team should communicate with receiving center personnel regarding the neonate's history, current status, and planned management.

K. Before arrival at the receiving center, the transport team should communicate the status of the neonate and anticipated needs on admission.

L. A telephone call should be made to the parents shortly following admission of the neonate.

M. Within 24 hours of admission, communication with referring center personnel regarding events during transport and since admission should occur.

N. Periodic communication with the referring physician should be maintained.

O. The patient should be returned to the care of the referring physician as soon as possible.

P. Upon discharge of the infant, a discharge summary should be sent to the referring physician.

NEONATAL TRANSPORT PERSONNEL

I. The composition of the transport team should be decided jointly by the referring health care provider and receiving physician(s) based on the condition of the neonate.

II. Transport team members should be selected from appropriately trained physicians, neonatal nurse practitioners, registered nurses, respiratory therapists, emergency medical technicians and paramedics. The minimum number of transport team members should be three. The leader of the transport team should be a neonatologist, neonatal fellow, neonatal nurse practitioner, or advanced practice nurse. The second team member should be a registered nurse, paramedic, or respiratory therapist. The third team member may be the operator of the transport vehicle.

III. Transport team members should have the collective expertise sufficient to provide:

A. observation of the neonate throughout the transport.
B. monitoring of body temperature, respiratory status, and cardiovascular status.
C. delivery and monitoring of oxygen therapy.
D. positive pressure ventilation, using either a face mask and/or endotracheal tube.
E. recognition and management of a wide variety of emergency conditions.

IV. At least two members of the transport team should be current **N**eonatal **R**esuscitation **P**rogram (American Academy of Pediatrics and American Heart Association) providers.

V. Transport team members should be thoroughly familiar with the transport vehicle and use of transport equipment.

VI. The knowledge and skills required for a nurse to perform neonatal transport are listed in the most current edition of Educational Objectives for Nurses, Levels I, II, III Neonatal Transport Tennessee Perinatal Care System, Tennessee Department of Health, Maternal and Child Health Section (Appendix III).

NEONATAL TRANSPORT VEHICLE

I. Selection of the mobile neonatal intensive care unit should be based on the condition of the neonate.

II. The vehicle used exclusively for the provision of neonatal intensive care and transportation between medical facilities shall conform with the following standards for design and construction as defined by the EMS Division of the Tennessee Department of Health. (Tennessee Emergency Medical Services Statutes and Rules, Rule 1200-12-1-.02[4] Special Vehicle Requirements)

A. Exterior surfaces, emblems, and markings shall conform to Federal Specifications-Ambulance.

B. Additional markings, legends, or logos may be used to identify the provider and purpose for specific vehicles, except that no letter shall exceed 14 inches in height. Legends as "neonatal intensive care or critical care transport" may be substituted for the "Ambulance" in exterior markings.

C. Warning lights and siren shall be furnished in accordance with Federal Specification-Ambulance except that side floodlights shall not be required.

D. Vehicle crashworthiness shall be assured with roll-cage construction evidenced by compliance with the Ambulance Manufacturer's Division Standards of the Truck Body and Equipment Association or comparable construction under written statement and performance bond by the manufacturer.

E. Doors shall provide access to the rear and curbside of the patient compartment. Where the vertical lift distance of the patient loading area exceeds 28 inches, a ramp or electrical-hydraulic lift shall be furnished to facilitate patient loading.

F. Environmental systems on the unit shall meet heating/air-conditioning standards as specified in Federal Specifications-Ambulance.

G. Vehicle electrical systems shall be provided to furnish 110 volt AC power sufficient to sustain 3,000 watts at 60 cycles. The unit shall be equipped with a back-up power system sufficient to operate patient care equipment in the event of failure of the main power systems. The 110 volt system shall incorporate a ground fault interrupter device for protection against electrical hazards.

H. Patient compartment shall be so designed to provide the following:

1. a properly secured transport incubator allowing observation from at least two sides
2. an optional overhead warmer
3. compartments for appropriate storage of materials
4. illumination at the primary patient care area of at least 75 foot candles
5. safety features such as sculpted, padded, or recessed cabinet corners and latches to prevent undue injury during sudden deceleration
6. safety devices such as a grab rail or hand strap, secured according to Federal Motor Vehicle Safety Standards for safety restraints, safety belts provided at all attendant seats, and safety restraint devices for neonates

I. An oxygen system with sufficient capacity to deliver a minimum continuous flow of 8

liters per minute for at least four hours must be available. The installed oxygen system shall be capable of delivering specific monitored blended oxygen concentrations.

J. The vehicle shall provide environmental conditions for the neonate that minimizes the risk of temperature instability and excessive noise and vibration.

III. In the event a RWA or FWA is used for neonatal transport, the following additional precautions should be observed:

A. use of a licensed air medical transport program
B. secure fastening of transport equipment
C. an independent power source to allow uninterrupted and fail-safe operation of the incubator and other supporting equipment
D. environmental conditions for the neonate that minimize the risk of temperature instability, noise and vibration
E. protective headgear for crew use during transport
F. system for easy communication among the members of the transport team
G. seat belts
H. seating arrangement that permits close observation and handling of the patient

IV. Latex free equipment and supplies should be available, when possible.

NEONATAL TRANSPORT EQUIPMENT

I. Organization and maintenance of neonatal transport equipment is the responsibility of the transporting facility.

II. Equipment to maintain a neutral thermal environment for the neonate should include:

A. transport incubator
B. thermometer
C. blanket, insulating blanket or chemically activated heat pack (appropriate for neonatal use)

III. The transport incubator should meet the following requirements:

A. approved by the manufacturer for use during transport and installed in the transport vehicle with crashworthy restraints.
B. if used in RWA and FWA it shall meet FAA requirements for crashworthiness and flammability of materials. The transport incubator and monitoring equipment should be tested by an FAA certified mechanic to assure equipment does not interfere with navigational instruments.
C. a heat source that requires minimal time for preheating and should maintain ambient temperature within the desired range of 29^{o} to 36^{o} C. The control for temperature setting should be readily accessible and easy to operate, and there should be provision for easy determination of ambient temperature. It is essential to have a fail-safe alarm system that will recognize overheating or underheating.
D. provide an environment in which the oxygen supply is constant and controllable.
E. provide unrestricted visibility of the neonate with a functional independent light source for general illumination provided in or on the incubator.
F. easy accessibility to the neonate resulting in minimal interference with thermal protection and oxygen supply.
G. safety restraint devices to secure the neonate inside the incubator that conform to Federal Motor Vehicle Safety Standards.

IV. The use of an overhead radiant warmer with a servo-control mode is optional.

V. Equipment for oxygen delivery and monitoring should include:

A. oxygen tanks
B. air tanks
C. pressure gauges
D. flowmeters
E. oxygen analyzer
F. oxygen blender
G. oxygen tubing and adapters
H. oxygen hood or nasal cannula
I. neonatal oxygen mask

J. neonatal resuscitation bag and mask with manometer
K. continuous positive airway pressure apparatus
L. mechanical ventilator
M. noninvasive oxygen monitor (e.g., pulse oximeter)

VI. The following guidelines are related to the use of oxygen during transport:

A. a portable supply of oxygen and compressed air in cylinders adequate to last the entire journey with surplus to cover unexpected needs and delays should be carried. Proper fixation of these cylinders is mandatory throughout the transport. An oxygen cylinder usage chart may be used in determining the number and type of oxygen cylinders necessary during transport (Appendix IV).
B. oxygen cylinders in use should be provided with pressure gauges and flow meters.
C. the ambient oxygen concentration must be monitored continuously by an oxygen analyzer.

VII. Devices to maintain the patency of the airway and gastric decompression must be readily available and should include:

A. bulb syringe
B. regulated suction with gauge
C. suction catheters (#6, 8, 10 Fr)
D. feeding tube (#8 Fr) with a 20 mL syringe
E. Replogle tube (#8 Fr)

VIII. Equipment for vital sign monitoring should include:

A. a continuous heart rate monitor
B. neonatal stethoscope
C. body temperature monitor
D. noninvasive and invasive blood pressure

IX. Equipment for monitoring blood glucose must be available.

X. If intravenous therapy is required, an infusion pump that is portable, battery-powered, fail-safe, and calibrated to ensure accurate delivery of calculated fluid volumes should be used. Critical neonates may require multiple intravenous lines requiring additional infusion pumps.

XI. The equipment and supplies required for resuscitation of a neonate must be available, portable and should include:

A. Endotracheal intubation

1. laryngoscope handle with blades (#00, 0, 1)
2. laryngoscope spare bulbs
3. laryngoscope spare batteries

4. endotracheal tubes (#2.5, 3.0, 3.5, 4.0 mmID)
5. neonatal resuscitation bag and mask
6. disposable stylet (#6 Fr)
7. adhesive tape
8. scissors

B. Intravenous infusion

1. intravenous needles and catheters (#22, 23, 24, 25, 26 gauge)
2. syringes (1, 3, 6, 12, 20, 35 mL)
3. intravenous armboard
4. intravenous tubing
5. infusion device
6. tape
7. alcohol preps
8. Betadine preps
9. 3-way stopcock
10. umbilical catheterization equipment

C. Medications

1. adenosine
2. ampicillin
3. atropine
4. calcium gluconate
5. chloral hydrate
6. dextrose solution(D5W)
7. dextrose solution(D10W)
8. digoxin
9. dobutamine
10. dopamine
11. epinephrine (1:10,000)
12. fentanyl
13. furosemide
14. gentamicin
15. heparin
16. morphine sulfate
17. naloxone hydrochloride
18. normal saline
19. phenobarbital
20. prostaglandin E_1 (requires refrigeration)
21. sodium bicarbonate (4.2%)
22. sterile water
23. surfactant (requires refrigeration)

24. THAM

XII. Equipment for diagnosis and management of air leak syndrome

A. transilluminator
B. chest tubes (8,10, 12 Fr)
C. chest tube kit
D. 25g angiocath or butterfly
E. Heimlich valve
F. 3-way stopcock
G. luer lock and slip tip syringe (35/60cc)

XIII. Equipment for handwashing and personal protection:

A. antiseptic solution or towelettes
B. gloves
C. full face protection or goggles and masks
D. fluid-retardant and fluid-resistant gowns
E. infectious waste disposal bags
F. soiled linen disposal bags
G. sharps box

XIV. Latex free equipment and supplies should be available, when possible.

NEONATAL REFERRAL DOCUMENTATION

I. Records are essential for continuing care of the patient and evaluation of the referral process. Both referring and receiving center personnel have responsibilities to provide adequate documentation of clinical data.

II. REFERRING CENTER RESPONSIBILITIES:

A. The following documents should accompany the transported neonate:

1. copy of complete maternal prenatal record
2. copy of current maternal medical record
3. copy of infant medical record
4. a completed neonatal referral history form (example in Appendix V)
5. a completed neonatal transport worksheet (example in Appendix VI)

B. The referring center should maintain a record regarding disposition of transported neonates.

III. RECEIVING CENTER RESPONSIBILITIES:

A. maintain a record of consultation/referral calls
B. maintain a record regarding the disposition of the transported neonate
C. send a discharge summary to the referring physician

EVALUATION OF NEONATAL REFERRAL PROCESS

I. Interhospital care of the high-risk neonate requires the cooperation and coordination of many skilled persons. Outreach education efforts should include discussions of the regional referral process and can be used to reinforce that cooperation and coordination.

II. Outreach education related to transport should focus on the following objectives:

A. informing perinatal care and EMS providers in the region of specialized resources available to them through the perinatal network.
B. assisting neonatal care providers in developing their abilities to identify high-risk neonatal patients, anticipate complications, and stabilize those patients before transport.
C. continuing quality improvement through ongoing education of neonatal care providers and EMS providers.

III. Planning of the neonatal referral process requires participation of those who will use the service and those who will provide it. Criteria considered in planning and evaluating the referral process are:

A. availability
B. accessibility
C. responsiveness
D. effectiveness

IV. Referring facilities should periodically review their neonatal referrals.

RETURN TRANSPORT

RETURN TRANSPORT

I. Return transports occur to take patients back to their original or local hospital for further care when the problems that required initial transport have been resolved. Return transports should be recognized as an important benefit to the individual patient and regionalized perinatal care system. Early planning of return transports is desirable.

II. MATERNAL RETURN TRANSPORT

A. The hospital to which the maternal patient is returned and the timing of the return transport are largely determined by individual patient care needs and institutional capabilities.

B. The composition of the transport team should be based on the condition of the patient.

C. A ground ambulance is the most appropriate vehicle for the majority of maternal return transports. If an alternative form of transportation is being considered, the referring health care provider should discuss this alternative mode with the receiving physician.

D. A telephone consultation with the receiving health care provider is necessary to initiate the return transport process and to prepare the receiving center. This consultation may aid the physician in developing a treatment plan.

E. The physician directing the return transport is responsible for the patient during transport.

F. Consent forms to authorize transfer, treatment, and admission to the receiving hospital must be obtained. (COBRA, EMTALA; see Appendix IX)

G. A discharge summary should accompany the patient.

III. NEONATAL RETURN TRANSPORT

A. The hospital to which the neonate is returned and the timing of the return transport are largely determined by individual patient care needs and receiving institutional capabilities.

B. A telephone consultation with the receiving health care provider is necessary to initiate the return transport process and to prepare the receiving hospital. This consultation may aid the health care provider and nursing staff in developing a treatment plan. In the event the neonate is returned to a hospital other than the original referring hospital, approval of the original referring health care provider must be obtained.

C. The mode of transport, composition of the transport team, and equipment needs should be based on the condition of the neonate and other factors.

D. The physician directing the return transport is responsible for the patient during transport.

E. Consent forms to authorize transfer, treatment, and admission to the receiving center must be obtained.

F. The parents should be encouraged to visit and become familiar with the receiving center nursery prior to the return transport.

G. The transport team should communicate with receiving center personnel regarding the estimated time of arrival.

H. On admission of the neonate to the receiving center, the transport team should communicate with receiving center personnel regarding the neonate's history, events during transport, and current status (Appendix VII)

I. A discharge summary should accompany the patient.

J. Periodic communication between referring and receiving hospitals should be maintained (Appendix VIII).

APPENDICES

APPENDIX I

MATERNAL REFERRAL FORM

PLEASE COMPLETE FORM AND SEND WITH PATIENT, ALONG WITH PERTINENT CLINICAL RECORDS (PRENATAL RECORDS, HOSPITAL CHART, RECENT LAB DATA, ETC)

Date _____
Patient's Name _____ Age _____ Grav _____ Para _____ AB _____
LMP _____ EDC _____ Gestation _____ Blood type/RH _____ Allergies _____
Address _____ County _____
Referring M.D. _____ Referring Hospital _____
Address _____ Phone _____
Transport Accepted By: _____

REASON FOR REFERRAL

☐ Preterm labor ☐ Diabetes ☐ Post term pregnancy

☐ Premature ROM ☐ Hypertension ☐ Fetal demise

☐ Vaginal bleeding ☐ PIH

☐ Other (Specify) _____

TRANSPORT MODE

☐ Ambulance ☐ Private Auto ☐ Air Transport

☐ M.D. ☐ R.N. ☐ L.P.N. ☐ Paramedic ☐ EMT ☐ Other

Accompanied By: _____

TREATMENT AND OUTCOME (To be completed by Regionalization Office)
Hospital # _____ Attending M.D. _____
Initial Treatment: _____

_____

Delivery Information: Date _____ Time _____ Infant to ☐ NBN ☐ NICU
Apgars 1 Min. _____ 5 Min. _____ Weight _____ Sex _____
Vaginal _____ Cesarean Section _____ Anesthesia _____

Complications: _____

CONDITION AND/OR POST-PARTUM NOTES

_____
_____
_____

APPENDIX II
MATERNAL TRANSPORT WORKSHEET

I. Care at Referring Hospital

A. Labor Assessment

Fetal monitor: y/n int/ext
Onset of contractions: ____/____ at _____ am/pm
Membranes:____intact___ruptured ___/____at ___am/pm
Comments:_____
_____
_____

B. Pelvic exam Upon admission Last exam ____ am/pm

cm dilatation _____ _____
% effacement _____ _____
Station _____ _____

C. Meds and IVF previous 24 hours Dose/Route Time

_____
_____
_____
_____

D. Intake & Output
_____ cc IV in
_____ cc urine out

E. Ultrasound
Date___/____
Results

III. If delivery occurred in route:

Date____ Time____am/pm Apgar____ 1 min.____5 min.
Resuscitation: ☐ stimulation ☐ 0_2 to face ☐ IPPB
Comments:

Report given to nursery by:_____

Received by:_____

II. Care en route (assess at least q 30 minutes)

Time	B/P	P	R	Contractions		FHT	DTR	IV Count
				Freq	Duration			

ADDITIONAL NOTES/REMARKS

Report given to:_____

Received by:_____

APPENDIX III

EDUCATIONAL OBJECTIVES FOR NEONATAL TRANSPORT NURSES

Educational Objectives for Nurses, Levels I, II, III, Neonatal Transport (the most recent edition), Tennessee Perinatal Care System, Tennessee Department of Health, Maternal and Child Health Section.

The nurse caring for neonatal patients during transport should be able to meet the objectives listed for each of the following categories:

I. PROBLEMS OF PREGNANCY, FETAL DEVELOPMENT, LABOR AND DELIVERY

A. Obtain from a referring caretaker reports of all tests done to determine fetal gestational age and well-being.

B. Utilize data from the maternal/neonatal history as a basis for anticipating problems, planning, and implementing care during transport.

C. Provide for a receiving caretaker, maternal and neonatal data which give adequate history of problems resulting from pregnancy, labor, and delivery, as well as treatment provided.

II. RESUSCITATION OF THE NEONATE

A. Provide for a receiving caretaker an accurate record of required resuscitative procedures and the neonate's physiological responses.

III. PHYSICAL ASSESSMENT OF THE NEWBORN

A. Collaborate with other transport team members in obtaining a thorough physical assessment prior to transport.

B. Describe and initiate an assessment plan during transport that will identify infant problems when they are most amenable to intervention.

C. Provide for a receiving physician a complete record of physical assessment, which includes information from the referring care providers, as well as the transport staff.

IV. THERMOREGULATION

A. Explain the effect of environmental factors, e.g., humidity, ambient temperature, and velocity of air flow on the thermal status of the neonate.

B. Describe safe methods of maintaining, increasing, and decreasing a neonate's temperature in a transport situation.

C. Provide a receiving caretaker with a thorough history of the infant's thermoregulation problems, treatment of these problems, and infant responses to intervention prior to and during transport.

V. NUTRITIONAL REQUIREMENTS OF THE NEONATE

A. Describe the effects of speed, acceleration, and deceleration on gastrointestinal motility and sphincter control.

B. Describe safe means of providing infant nutrition in a variety of transport situations.

C. Obtain from a referring caretaker an accurate nutritional record for the receiving caretaker.

VI. INTRAVASCULAR THERAPY

A. Describe and utilize safe, efficient measures to limit the effects of transport on intravascular therapy.

B. Prepare fluids and blood products that may be required during transport.

C. Record for a receiving caretaker an accurate summary of fluid and blood products infused prior to and during transport.

VII. MEDICATION ADMINISTRATION

A. Provide for a receiving caretaker an accurate record of medications used prior to and during transport and the neonate's responses.

VIII. FLUID, ELECTROLYTE, AND ACID-BASE BALANCE

A. Describe the effects of marked changes in humidity, velocity, and pressure on insensible fluid loss, and measures to limit these effects.

B. Obtain and record an accurate summary of fluid, electrolyte and acid-base status prior to and during transport.

IX. RESPIRATORY DISORDERS OF THE NEWBORN

A. Describe the effects of altering atmospheric pressure, altitude, temperature, and humidity on neonatal respiratory function, and discuss nursing measures to minimize these effects.

B. Select and utilize respiratory measures, pharmacologic agents, intravenous orders, and infant positioning to assist in lessening or preventing the disorders listed above.

C. Obtain an accurate history of respiratory status and respiratory support provided prior to transport and develop an ongoing record of assessment, evaluation, and respiratory support for the receiving center.

X. RESPIRATORY SUPPORT SYSTEMS

A. Determine the settings to be used when the infant is switched from:

1. A pressure cycle to a time cycled/pressure limited ventilator;
2. A time cycled/pressure limited ventilator to a pressure-cycled ventilator;
3. A volume cycled ventilator to a pressure-cycled ventilator.

B. Set up and correctly utilize respiratory support and monitoring equipment used during transport.

XI. HEMATOLOGIC DISORDERS OF THE NEWBORN

A. Collaborate with the Transport Team Leader in obtaining reports or specimens for a hematologic data base, including information on the treatment of these disorders prior to and during transport.

B. Collaborate with the referral center in obtaining blood or blood products which may be required during transport to the receiving center.

C. Provide for a receiving caretaker an accurate hematologic history, including treatment during transport.

XII. GASTROINTESTINAL PROBLEMS OF THE NEWBORN

A. Identify the special techniques and measures required to limit the side effects of gastrointestinal obstructions and/or abdominal wall defects, during transport.

B. Provide for a receiving caretaker, a history of gastrointestinal function, treatment, and neonatal response prior to and during transport.

XIII. PERINATAL INFECTION

A. Collaborate with the Transport Team Leader in providing the different components of a septic work-up, in a safe and timely manner.

B. Develop and implement procedures which will enhance prevention of infection in transport situations.

C. Obtain from a referring caretaker and provide for the receiving caretaker a history which identifies a neonate's risk of infection.

XIV. CARDIAC DISORDERS OF THE NEONATE

A. Design and implement a plan of care that will provide maximum protection from hypoxic damage for the infant who has cardiac disorders.

B. Provide for a receiving caretaker a thorough report of cardiovascular problems, treatment, and neonatal condition prior to and during transport.

XV. PARENT-INFANT RELATIONSHIPS

A. Describe and utilize measures which will enhance a positive relationship between parents and health care personnel in the referring and receiving centers.

B. Describe the potential effects of transport on the development of a positive parent-infant relationship.

C. Describe and utilize measures that will minimize the negative effects of transport on parent-infant bonding.

D. Provide for a receiving caretaker a report of significant parent, neonate, and staff interactions.

XVI. REFERRING-RECEIVING CARETAKER RELATIONSHIPS

A. When given a report by a referring caretaker, anticipate and rapidly request information necessary to provide continuous expert care.

B. Collaborate with other nurses in the perinatal region in developing transport plans that provide comprehensive, continuous, and expert care.

C. Describe the general types of services available in Level I, II, and III, newborn facilities.

D. Identify and communicate effectively the attributes and limitations of Level I, II, and III facilities in the region.

E. Describe, utilize, and communicate to others appropriate procedures for initiating consultation, referral, and transport.

F. Describe and prepare the written records required prior to transport.

G. Identify and evaluate communication patterns in the transport region.

H. Seek and accept constructive evaluation of the referral process from nurses in Level I, II, III, and IV facilities.

I. Utilize constructive criticism and effective communication skills as a basis for improving individual care, improving continuity of expert care within the regional center, and improving care of infants referred to and received from other facilities.

XVII. TRANSPORT SAFETY

A. Describe those factors that must be considered in the selection of a vehicle and professional personnel for transport.

B. Describe and utilize effective techniques for securing transport equipment and compressed medical gas tanks in transport vehicles.

C. Determine adequacy of illumination in transport vehicles.

D. Provide continuous visibility of the infant, support equipment, and monitors during transport.

E. Determine that space available in the transport vehicle is adequate for safe emergency intervention during transport.

F. Describe briefly the effects of vibration and sound level on the infant in transit and develop a plan to diminish these effects.

G. Determine the adequacy of power sources to assure uninterrupted power availability during transport.

H. State the potential hazards of vehicle acceleration, deceleration, and speed on the transported infant, and take appropriate measures to limit their occurrence, including an appropriate restraint system.

I. Determine and provide an adequate supply of oxygen and air required for transport.

J. Describe and utilize effective methods for testing equipment function prior to transport.

K. Identify and provide the life support and monitoring equipment and supplies necessary for transport.

L. Implement a plan which provides for replacement, cleaning, and maintenance of transport vehicle, equipment, and supplies.

M. Communicate an infant assessment which will assure adequate professional support and equipment upon the arrival of the transported infant at the receiving center.

N. Describe to others and utilize appropriate steps for stabilizing the infant prior to transport.

O. Utilize the vehicle communication system effectively in obtaining consultation from other professional personnel during transport.

P. Maintain records, which can be readily utilized to evaluate the effectiveness of the transport system.

Q. Assist in evaluation and implement measures to improve the transport process.

APPENDIX IV

OXYGEN CYLINDER USAGE DURING TRANSPORT

OXYGEN CYLINDERS: DURATION OF FLOW

SIMPLE FORMULA:
Gauge pressure in psi (pounds per square inch) minus the safe residual pressure (always 200 psi) times the constant (see list below) divided by the flow rate in liters per minute = duration of flow in minutes.

CYLINDER CONSTANTS

D = 0.16 G = 2.41
E = 0.28 H = 3.14
M = 1.56 K = 3.14

EXAMPLE
Determine the life of an M cylinder that has a pressure of 2000 psi displayed on the pressure gauge and a flow rate of 10 liters per minute.

$$\frac{(2000-200) \times 1.56}{10} = \frac{2808}{10} = 280.8 \text{ minutes}$$

OXYGEN SUPPLY AND REGULATORS

Oxygen is supplied either as a compressed gas or as a liquid. Compressed gaseous oxygen is stored in an aluminum or steel tank in 400 liter (D), 660 liter (E), or 3,450 liter (M) volumes. To calculate how long the oxygen will last:

Tank life in minutes = (tank pressure in psi X 0.28) ÷ liters per minute

APPENDIX V

NEONATAL REFERRAL HISTORY

I. IDENTIFICATION:

Baby's Name: _____ Sex: _____ Race: _____

Date of Birth: _____ Time of Birth: _____

Place of Birth _____ Referring Hospital: _____

Father's Name: _____ Occupation: _____

Address: _____ Home Phone: _____

County of Residence: _____ Work Phone: _____

Referring Physician: _____

II. MATERNAL HISTORY:

Mother's Name: _____ Age: _____ Birthdate: _____
Last, First, Middle, Maiden

Mother's Social Security Number: _____

Prepregnant Weight: _____ Height: _____ Weight at Delivery: _____

Smoking: No/Yes (_____ cig/day) Drugs: No/Yes What: _____

Alcohol: No/Yes Hypertension: No/Yes
Chronic or PIH

Chronic Renal Disease: No/Yes Diabetes: No/Yes (Class: _____)

Chronic Pulmonary Disease: No/Yes

Heart Disease: No/Yes

Married: No/Yes Occupation: _____

Blood type: _____ G:_____ P:_____ Term:_____ Premature:_____ Ab: _____
Stillbirths:_____

III. PREVIOUS PREGNANCIES:

	Year	Birthweight	Gestational Age	Sex	VAG/C-Section	VTX/Breech	Special Care Required
1.							
2.							
3.							
4.							

IV. PRESENT PREGNANCY:

Planned/Unplanned LMP: _____ Sure/Unsure

EDC by Dates: _____ EDC by Ultrasound: _____

Prenatal Care Began: _____ I/II/III trimester

Month/Day/Year _____

Number of Prenatal Visits: _____ Prenatal Physician: _____

Antibody Screen: _____ PPD: _____

GC: _____ VDRL: _____

Problems during Pregnancy:

Infections: _____ Premature Labor (Dates): _____

Bleeding: _____ Glycosuria: _____

Blood Pressure: _____ Edema: _____

Illnesses: _____ Proteinuria: _____

V. LABOR AND DELIVERY:

Labor: Spontaneous/Induced Indication for Induction: _____

Duration: 1st Stage _____ 2nd Stage _____

Rupture of Membranes: Spontaneous/Artificial

Date and Time of ROM: _____ Duration PTD: _____

Amniotic fluid: Polyhydramnios/Oligohydramnios/Foul Smelling/Clear/Meconium-Stained/Cloudy/Bloody

Amniotic Fluid Culture: Yes/No

Vaginal Bleeding (Amount, Pain, When): _____

Medications: Time Amount Mode

Analgesics: _____

Antibiotics: _____

Pitocin: _____

Other: _____

Fetal Monitoring: Decreased FHT Variability

Extended Fetal Bradycardia

Extended Fetal Tachycardia

Late Deceleration

Variable Deceleration

VI. DELIVERY:

Delivering Physician: _____

Anesthesia: _____

Vaginal Presentation: VTX, Breech, Face, Brow

Assisted Delivery: Low Forceps, Mid Forceps, Vacuum Extraction, Rotation

C-Section: _____ Indication: _____ Type of Incision: _____

Problems During Delivery: _____

Placenta Description: Weight:

Abruption Present (%)/Absent Calcification: Present/Absent

VII. INFANT AT BIRTH:

Time of Birth: _____ Birth Weight: _____

Gestational Age by Dates: _____ By Exam: _____ By Ultrasound: _____

APGAR SCORE:	1 min	5 min	min
Heart Rate			
Resp Effort			
Muscle Tone			
Reflex Irritability			
Color			
Total:			

Resuscitation:

Oxygen (Method Used) _____

Suction: Oropharynx/Endotracheal Meconium: No/Yes

Endotracheal Intubation: No/Yes How long: _____

Positive Pressure Ventilation: No/Yes How long: _____

Manual/Ventilator

Medications: Time _____ Type _____ Amount _____ Mode _____

VIII. INFANT AFTER BIRTH:

Problems: _____

Pretransport Stabilization:

Oxygen (Mode and %)

Intubation: No/Yes

Bagging/Ventilator: _____ Rate: _____ Pressure: _____

IV fluids: Type: _____ Rate/Hr: _____

Mode of IV Administration: UA/UV/Peripheral _____

Medications:

Eye Prophylaxis: _____

Vit K (Amt): _____

Antibiotics: Time _____ Type _____ Amount _____ Mode _____

Other: _____

Blood Studies:

Hematocrit: _____ % (Central/Peripheral)

Hemoglobin: _____

Blood type: _____ Coombs: _____

Blood count: _____

Blood gases: _____

Time	Source	pH	PO_2	PCO_2	BE	Respiratory Management

Chest X-Ray: _____

Has Baby Voided: No/Yes Stool: No/Yes

IX. COMMENTS:

APPENDIX VI
NEONATAL TRANSPORT WORKSHEET

DATE_____
TIME OF DEPARTURE_____
TIME OF ARRIVAL AT RECEIVING HOSPITAL_____
ATTENDING PHYSICIAN_____
TRANSPORT PHYSICIAN_____
TRANSPORT NURSE_____
RESPIRATORY THERAPIST_____
TRANSPORT DRIVER_____
OTHER PERSONNEL_____

PATIENT NAME_____ SEX_____
BIRTHDATE_____ TIME_____
BIRTHWEIGHT_____GRAMS
PRESENT WEIGHT_____GRAMS
REFERRING HOSPITAL_____
REFERRING PHYSICIAN_____
RECEIVING HOSPITAL_____
RECEIVING PHYSICIAN_____

					VENTILATION							BLOOD GASES				IV FLUIDS				
TIME	Infant Temp / Incubator	Heart Rate	Resp. Rate	BP	Delivery Mode	$Fi0_2$ / O_2Sat	PIP / PEEP	IMV Rate / I:E	Blood Drawn / Total Out	Glucose	HCT	PO_2	PCO_2	pH	HCO_3 or B.E.	TYPE FLUID	TOTAL INFUSED	BLOOD PRODUCTS	Meds.	PROCEDURES AND OBSERVATIONS

APPENDIX VII

NEONATAL RETURN TRANSPORT WORKSHEET

Transport information

Date of transport_____
Nurse_____
Ambulance _____
_____Time of departure
_____Arrival at receiving hospital
_____Departure from receiving hospital
_____Arrival back at referring hospital
Receiving hospital_____
Receiving nurse_____
Follow-up appointments _____
Check:
_____Discharge order written, signed
_____Physician transfer sheet included
_____Nursing discharge summary signed
_____Identification band on, checked
_____State screen done

Receiving physician_____

Patient information

Birth date_____
Place of birth_____
Birth weight_____
Discharge weight_____
Discharge diagnosis _____
_____
Parents' name_____
_____
Parents' telephone_____
Parents' address_____
_____
_____

Nursing information

Isolette temp required_____
Feedings: Formula/Breast Milk_____
Route_____
Amount _____
Last feeding_____
Any feeding problems_____
_____
_____
_____
_____

IV fluids:
Fluids_____
Route_____
Rate_____

Special Nursing Needs:

_____
_____
_____
_____
_____
_____
_____
_____

Original to Referring Hospital
Copy to receiving hospital

MEDICATION INFORMATION

	Medication	Dosage	Route	Frequency	Last dose
1.					
2.					
3.					
4.					

TRANSPORT RECORD

Time	Temp / Isol temp	Pulse rate	Resp rate	O_2%	Color	Void	Stool	IV fluids: Fluid amount	IV fluids: Total infused	Medications	Comments & observations

APPENDIX VIII

NEONATAL RETURN TRANSPORT FOLLOW-UP FORM

FOLLOW-UP INFORMATION ON BACK-TRANSPORTED INFANTS

Infant's name: _____

Date of birth: _____ Birth weight: _____ Gestational Age: _____

Back transport date: _____ Discharge diagnosis (es): _____

Receiving hospital: _____ Receiving physician: _____

Current weight: _____ Length: _____ Head Circumference: _____ Age: _____ 0_2: _____

PLEASE FILL IN UPON DISCHARGE HOME AND RETURN TO ADDRESS OR FAX AT BOTTOM

Date of discharge: _____ Discharge weight: _____

PCP or health clinic: _____

Current parents/custodians: Name: _____

Street Address: _____

City/State/ZIP: _____

Area Code/Phone: _____

Clinical course in your institution prior to discharge:

Total days on O_2 after transport?: _____ BPD appointment if home on O_2? Y / N

	Yes	No	Follow-up appointment (y/n)
Ophthalmology exam?			
Head ultrasound?			
Audiology test?			
Synagis injection?			

Please check all that apply at discharge:

Equipment	
Oxygen	
Oximeter	
Monitor	
Suction	
Other	

Medications	
Vitamins	
Diuretics	
Antireflux	
Antibiotics	
Other	

Feeding problems	
GE reflux	
Gastrostomy	
Other	

Referrals	
TEIS	
KY First Steps	
Other	

(FAX # and/or address here)

APPENDIX IX

COBRA/EMTALA STATUTE: 42 USC 1395

There are a variety of resources for obtaining the COBRA/EMTALA Statute in its entirety. This information was obtained from the website www.medlaw.com.

The COBRA/EMTALA Statute was developed in response to actions construed as patient "dumping" related to reimbursement source. The EMTALA portion relates to the transfer and medical treatment of women in active labor. The components delineate the circumstances under which an individual may be transferred to another medical care facility and the steps to be undertaken for stabilization and treatment prior to transfer.

This federal law has been in effect for a number of years. All health care facilities have been made aware of these regulations and have programs in place to address these situations. Facilities that do not abide by these regulations are subject to significant monetary sanctions.

The Transportation guidelines have been written with the understanding that all facilities will abide by the federal regulations of COBRA/EMTALA. It is the intent of the subcommittee that all facilities will abide by COBRA/EMTALA regulations.